74HCS165-Q100

8-bit parallel-in/serial out shift register with Schmitt-trigger inputs

Rev. 1 — 27 May 2025 Product data sheet

1. General description

The 74HCS165-Q100 is an 8-bit serial or parallel-in/serial-out shift register. The device features a serial data input (DS), eight parallel data inputs (D0 to D7) and two complementary serial outputs (Q7 and $\overline{Q7}$). When the parallel load input ($\overline{PL}$) is LOW the data from D0 to D7 is loaded into the shift register asynchronously. When $\overline{PL}$ is HIGH data enters the register serially at DS. When the clock enable input ($\overline{CE}$) is LOW data is shifted on the LOW-to-HIGH transitions of the CP input. A HIGH on $\overline{CE}$ will disable the CP input. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC}.

All inputs are Schmitt-trigger inputs, capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Wide supply voltage range from 2.0 V to 6.0 V
- Schmitt-trigger inputs
- Low power consumption
  - Typical supply current (I_{CC}) of 100 nA
  - Typical input leakage current (I_I) of ±10 nA
- ±7.8 mA output drive at 6 V
- 8-bit serial input and 8-bit serial or parallel output
- Storage register with 3-state outputs
- Shift register with direct clear
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- Complies with JEDEC standards:
  - JESD7A (2.0 V to 6.0 V)
- ESD protection:
  - HBM ANSI/ESDA/JEDEC JS-001 class 3A exceeds 4000 V
  - CDM ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1500 V
- Multiple package options

3. Applications

- Parallel-to-serial data conversion
- Remote control holding register
- Output expansion
- LED matrix control
- 7-segment display control
- 8-bit data storage

4. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74HCS165D-Q100	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74HCS165PW-Q100	-40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
74HCS165BQ-Q100	-40 °C to +125 °C	DHVQFN16	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 16 terminals; body 2.5 × 3.5 × 0.85 mm	SOT763-1

5. Functional diagram

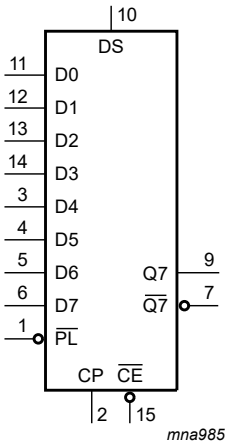


Fig. 1. Logic symbol

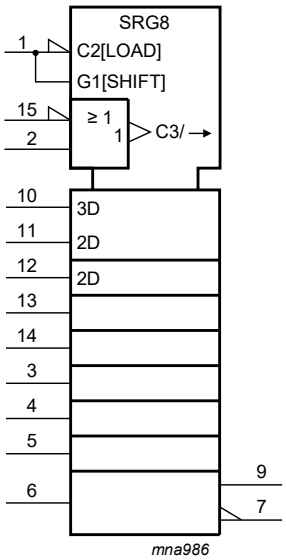


Fig. 2. IEC logic symbol

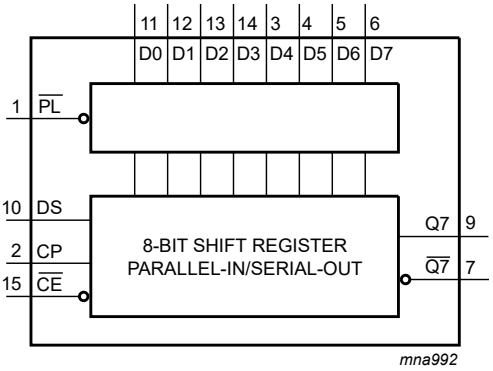


Fig. 3. Functional diagram

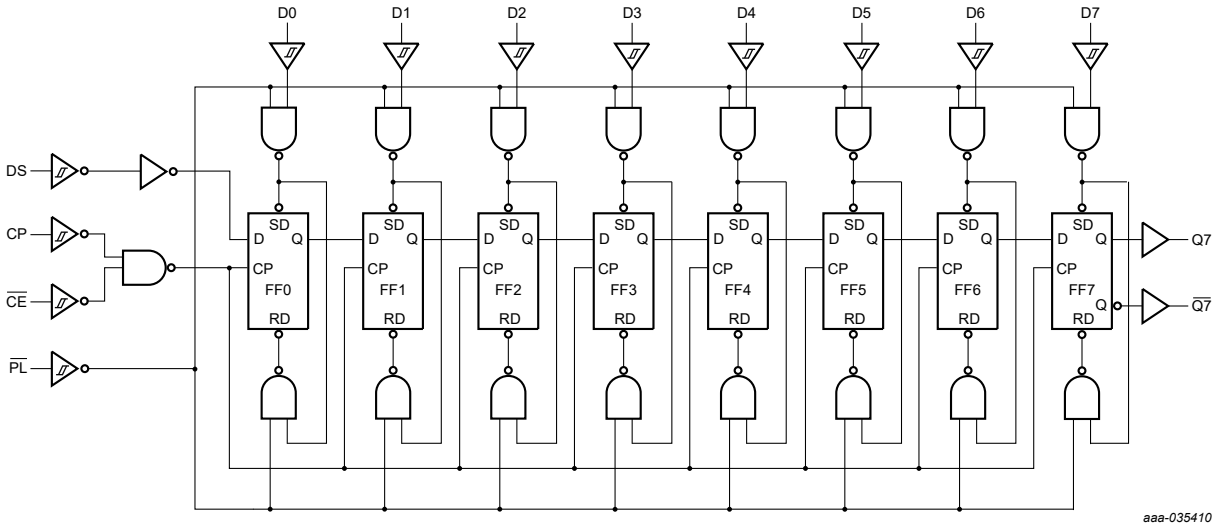
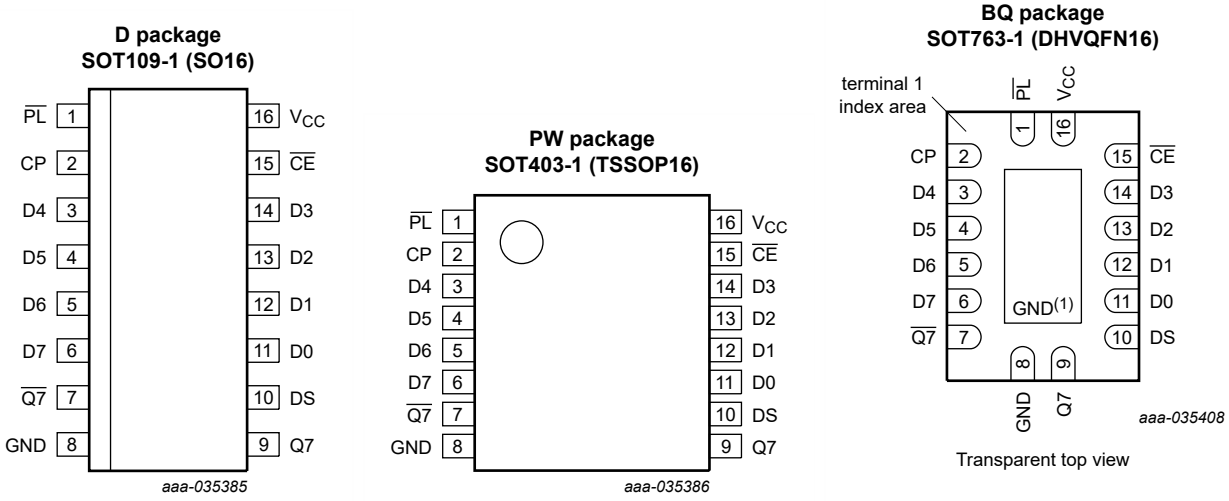


Fig. 4. Logic diagram

6. Pinning information

6.1. Pinning



(1) This is not a ground pin. There is no electrical or mechanical requirement to solder the pad. In case soldered, the solder land should remain floating or connected to GND.

6.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
$\overline{PL}$	1	asynchronous parallel load input (active LOW)
CP	2	clock input (LOW-to-HIGH edge-triggered)
$\overline{Q7}$	7	complementary output from the last stage
GND	8	ground (0 V)
Q7	9	serial output from the last stage
DS	10	serial data input
D0, D1, D2, D3, D4, D5, D6, D7	11, 12, 13, 14, 3, 4, 5, 6	parallel data inputs (also referred to as Dn)
$\overline{CE}$	15	clock enable input (active LOW)
V_{CC}	16	positive supply voltage

7. Functional description

Table 3. Function table

H = HIGH voltage level; h = HIGH voltage level one set-up time prior to the LOW-to-HIGH clock transition;
L = LOW voltage level; l = LOW voltage level one set-up time prior to the LOW-to-HIGH clock transition;
q = state of the referenced output one set-up time prior to the LOW-to-HIGH clock transition;
X = don't care; ↑ = LOW-to-HIGH clock transition.

Operating modes	Inputs					Qn registers		Outputs	
	$\overline{PL}$	$\overline{CE}$	CP	DS	D0 to D7	Q0	Q1 to Q6	Q7	$\overline{Q7}$
parallel load	L	X	X	X	L	L	L to L	L	H
	L	X	X	X	H	H	H to H	H	L
serial shift	H	L	↑	l	X	L	q0 to q5	q6	$\overline{q6}$
	H	L	↑	h	X	H	q0 to q5	q6	$\overline{q6}$
	H	↑	L	l	X	L	q0 to q5	q6	$\overline{q6}$
	H	↑	L	h	X	H	q0 to q5	q6	$\overline{q6}$
hold "do nothing"	H	H	X	X	X	q0	q1 to q6	q7	$\overline{q7}$
	H	X	H	X	X	q0	q1 to q6	q7	$\overline{q7}$

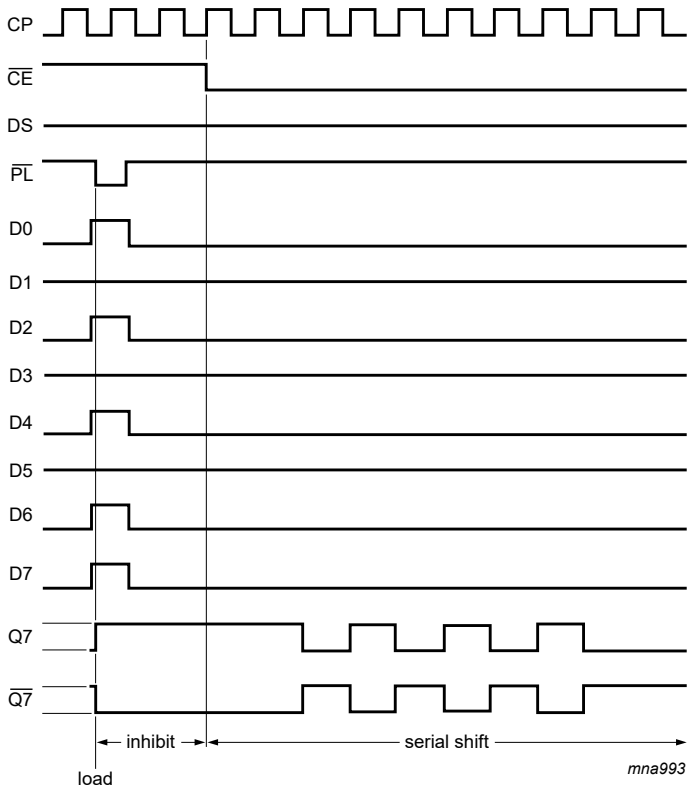


Fig. 5. Timing diagram

8. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		-0.5	+7	V
I_{IK}	input clamping current	$V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V [1]	-	±20	mA
I_{OK}	output clamping current	$V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V [1]	-	±20	mA
I_O	output current	V_O = 0 V to V_{CC}	-	±35	mA
I_{CC}	supply current		-	70	mA
I_{GND}	ground current		-70	-	mA
T_j	junction temperature	[2]	-	+150	°C
T_{stg}	storage temperature		-65	+150	°C
V_{ESD}	electrostatic discharge	HBM ANSI/ESDA/JEDEC JS-001 Class 3A exceeds 4000 V	-	±4000	V
		CDM ANSI/ESDA/JEDEC JS-002 Class C3 exceeds 1500 V	-	±1500	V
P_{tot}	total power dissipation	[3]	-	500	mW

[1] The minimum input and output voltage ratings may be exceeded if the input and output current ratings are observed.
[2] Guaranteed by design.
[3] For SOT109-1 (SO16) package: P_{tot} derates linearly with 12.4 mW/K above 110 °C.
For SOT403-1 (TSSOP16) package: P_{tot} derates linearly with 8.5 mW/K above 91 °C.
For SOT763-1 (DHVQFN16) package: P_{tot} derates linearly with 11.2 mW/K above 106 °C.

9. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage		2.0	5.0	6.0	V
V_I	input voltage		0	-	V_{CC}	V
V_O	output voltage		0	-	V_{CC}	V
T_{amb}	ambient temperature		-40	+25	+125	°C

10. Static characteristics

Table 6. Static characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
V_{T+}	positive-going threshold voltage	see Fig. 6 and Fig. 7								
		V_{CC} = 2.0 V	0.7	-	1.5	0.7	1.5	0.7	1.5	V
		V_{CC} = 4.5 V	1.7	-	3.15	1.7	3.15	1.7	3.15	V
		V_{CC} = 6 V	2.1	-	4.2	2.1	4.2	2.1	4.2	V
		V_{CC} = 3.0 V to 3.6 V	$0.4V_{CC}$	-	$0.7V_{CC}$	$0.4V_{CC}$	$0.7V_{CC}$	$0.4V_{CC}$	$0.7V_{CC}$	V
		V_{CC} = 4.5 V to 5.5 V	$0.38V_{CC}$	-	$0.7V_{CC}$	$0.38V_{CC}$	$0.7V_{CC}$	$0.38V_{CC}$	$0.7V_{CC}$	V
V_{T-}	negative-going threshold voltage	see Fig. 6 and Fig. 7								
		V_{CC} = 2.0 V	0.3	-	1.0	0.3	1.0	0.3	1.0	V
		V_{CC} = 4.5 V	0.9	-	2.2	0.9	2.2	0.9	2.2	V
		V_{CC} = 6 V	1.2	-	3.0	1.2	3.0	1.2	3.0	V
		V_{CC} = 3.0 V to 3.6 V	$0.2V_{CC}$	-	$0.5V_{CC}$	$0.2V_{CC}$	$0.5V_{CC}$	$0.2V_{CC}$	$0.5V_{CC}$	V
		V_{CC} = 4.5 V to 5.5 V	$0.2V_{CC}$	-	$0.49V_{CC}$	$0.2V_{CC}$	$0.49V_{CC}$	$0.2V_{CC}$	$0.49V_{CC}$	V
V_H	hysteresis voltage[1]	see Fig. 6 and Fig. 7								
		V_{CC} = 2.0 V	0.2	0.52	1.0	0.2	1.0	0.2	1.0	V
		V_{CC} = 4.5 V	0.4	0.85	1.4	0.4	1.4	0.4	1.4	V
		V_{CC} = 6 V	0.6	1.1	1.6	0.6	1.6	0.6	1.6	V
		V_{CC} = 3.0 V to 3.6 V	$0.1V_{CC}$	0.72	$0.38V_{CC}$	$0.1V_{CC}$	$0.38V_{CC}$	$0.1V_{CC}$	$0.38V_{CC}$	V
		V_{CC} = 4.5 V to 5.5 V	$0.09V_{CC}$	0.94	$0.29V_{CC}$	$0.09V_{CC}$	$0.29V_{CC}$	$0.09V_{CC}$	$0.29V_{CC}$	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL}								
		I_{OH} = -20 µA; V_{CC} = 2.0 V to 6 V	V_{CC}-0.1	V_{CC}-0.002	-	V_{CC}-0.1	-	V_{CC}-0.1	-	V
		I_{OH} = -4 mA; V_{CC} = 3.0 V	2.7	2.85	-	2.7	-	2.7	-	V
		I_{OH} = -6 mA; V_{CC} = 4.5 V	4.0	4.3	-	4.0	-	4.0	-	V
		I_{OH} = -7.8 mA; V_{CC} = 6.0 V	5.48	5.75	-	5.4	-	5.4	-	V

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}								
		I_{OL} = 20 µA; V_{CC} = 2.0 V to 6 V	-	0.002	0.1	-	0.1	-	0.1	V
		I_{OH} = 4 mA; V_{CC} = 3.0 V	-	0.14	0.25	-	0.25	-	0.25	V
		I_{OL} = 6 mA; V_{CC} = 4.5 V	-	0.18	0.26	-	0.30	-	0.30	V
		I_{OL} = 7.8 mA; V_{CC} = 6.0 V	-	0.22	0.26	-	0.33	-	0.33	V
I_I	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 6.0 V	-	±0.01	±0.1	-	±0.25	-	±1.0	µA
I_{CC}	supply current	$V_I = V_{CC}$ or GND; I_O = 0 A; V_{CC} = 6.0 V	-	0.1	-	-	0.5	-	2.0	µA

[1] Guaranteed by design.

10.1. Transfer characteristic waveforms and graphs

10.1.1. For inputs

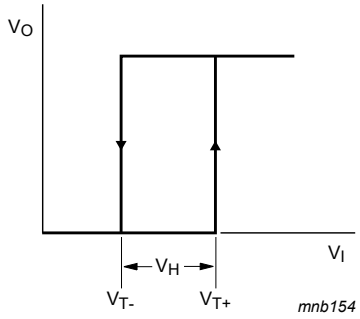


Fig. 6. Transfer characteristic

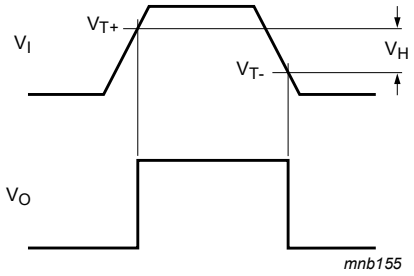
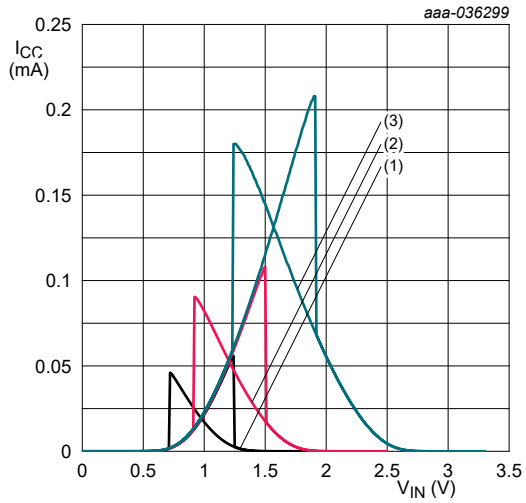
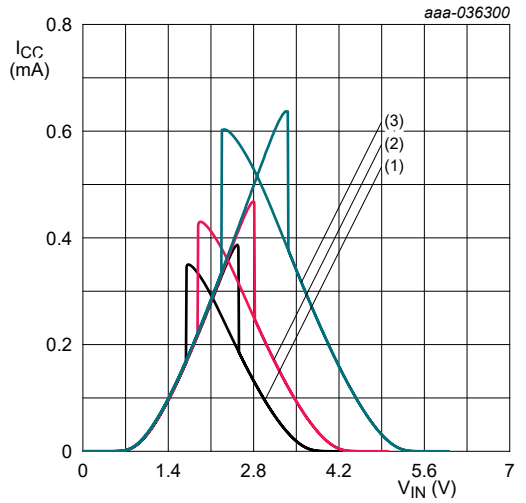


Fig. 7. Definitions of V_{T+}, V_{T-} and V_H



(1) V_{CC} = 2.0 V
(2) V_{CC} = 2.5 V
(3) V_{CC} = 3.3 V

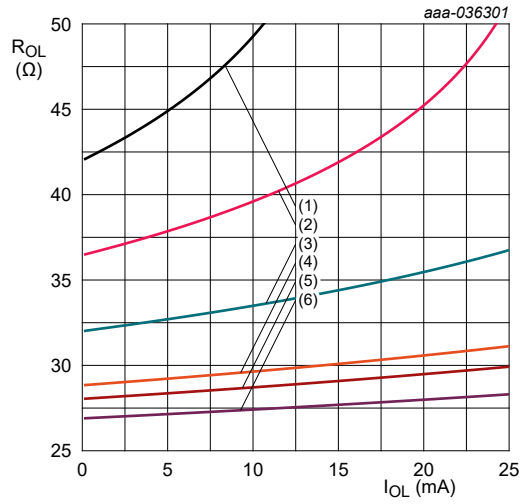
Fig. 8. Typical supply current vs the input voltage



(1) V_{CC} = 4.5 V
(2) V_{CC} = 5.0 V
(3) V_{CC} = 6.0 V

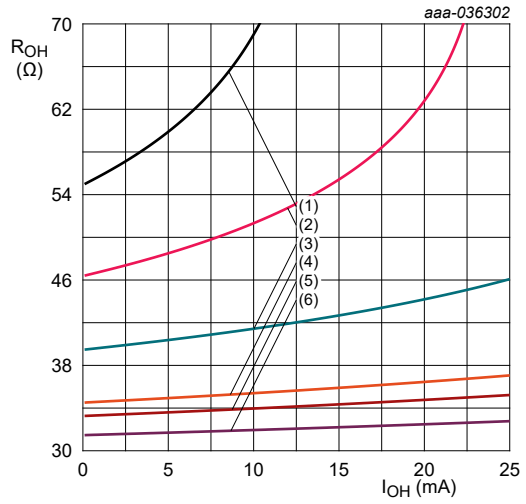
Fig. 9. Typical supply current vs the input voltage

10.1.2. For outputs



(1) V_{CC} = 2.0 V
(2) V_{CC} = 2.5 V
(3) V_{CC} = 3.3 V
(4) V_{CC} = 4.5 V
(5) V_{CC} = 5.0 V
(6) V_{CC} = 6.0 V

Fig. 10. Typical LOW-level output resistance as function of the output current



(1) V_{CC} = 2.0 V
(2) V_{CC} = 2.5 V
(3) V_{CC} = 3.3 V
(4) V_{CC} = 4.5 V
(5) V_{CC} = 5.0 V
(6) V_{CC} = 6.0 V

Fig. 11. Typical HIGH-level output resistance as function of the output current

11. Dynamic characteristics

Table 7. Dynamic characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for test circuit, see Fig. 17.

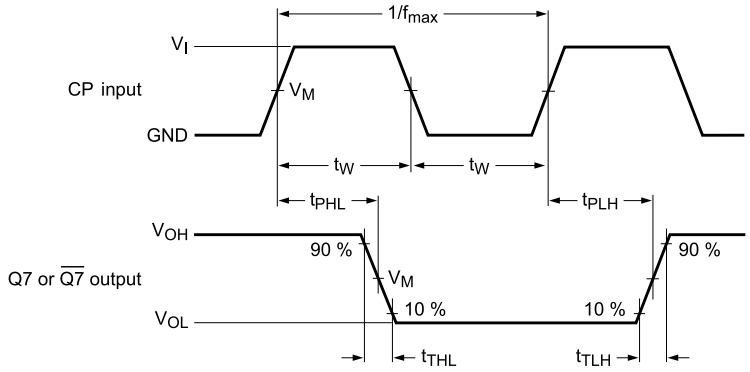
Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
t_{pd}	propagation delay	CP to Q7, $\overline{Q7}$; see Fig. 12 [2]								
		V_{CC} = 2.0 V	-	16	32	-	42	-	45	ns
		V_{CC} = 4.5 V	-	8	16	-	17	-	18	ns
		V_{CC} = 6.0 V	-	7	14	-	15	-	16	ns
		V_{CC} = 3.0 V to 3.6 V	-	10	20	-	21	-	23	ns
		V_{CC} = 4.5 V to 5.5 V	-	8	16	-	17	-	18	ns
		$\overline{PL}$ to Q7, $\overline{Q7}$; see Fig. 13								
		V_{CC} = 2.0 V	-	20	39	-	60	-	65	ns
		V_{CC} = 4.5 V	-	10	19	-	22	-	24	ns
		V_{CC} = 6.0 V	-	8	17	-	18	-	19	ns
		V_{CC} = 3.0 V to 3.6 V	-	12	25	-	28	-	31	ns
		V_{CC} = 4.5 V to 5.5 V	-	9	19	-	22	-	24	ns
		D7 to Q7, $\overline{Q7}$; see Fig. 14								
		V_{CC} = 2.0 V	-	20	30	-	44	-	48	ns
		V_{CC} = 4.5 V	-	9	15	-	17	-	18	ns
		V_{CC} = 6.0 V	-	8	14	-	15	-	16	ns
		V_{CC} = 3.0 V to 3.6 V	-	12	20	-	22	-	24	ns
		V_{CC} = 4.5 V to 5.5 V	-	9	15	-	17	-	18	ns
t_t	transition time	Q7, $\overline{Q7}$ output; see Fig. 12 [3]								
		V_{CC} = 2.0 V	-	9	13	-	15	-	16	ns
		V_{CC} = 4.5 V	-	5	7	-	8	-	8	ns
		V_{CC} = 6.0 V	-	4	6	-	7	-	7	ns
		V_{CC} = 3.0 V to 3.6 V	-	5	8	-	9	-	10	ns
		V_{CC} = 4.5 V to 5.5 V	-	4	7	-	8	-	8	ns
t_W	pulse width	CP input HIGH or LOW; see Fig. 12								
		V_{CC} = 2.0 V	7	-	-	10	-	11	-	ns
		V_{CC} = 4.5 V	6	-	-	7	-	7	-	ns
		V_{CC} = 6.0 V	6	-	-	7	-	7	-	ns
		V_{CC} = 3.0 V to 3.6 V	7	-	-	8	-	9	-	ns
		V_{CC} = 4.5 V to 5.5 V	6	-	-	7	-	7	-	ns
		$\overline{PL}$ input LOW; see Fig. 13								
		V_{CC} = 2.0 V	6	-	-	7	-	7	-	ns
		V_{CC} = 4.5 V	6	-	-	7	-	7	-	ns
		V_{CC} = 6.0 V	6	-	-	7	-	7	-	ns
		V_{CC} = 3.0 V to 3.6 V	6	-	-	7	-	7	-	ns
		V_{CC} = 4.5 V to 5.5 V	6	-	-	7	-	7	-	ns

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
t_{rec}	recovery time	$\overline{PL}$ input HIGH to CP; see Fig. 13								
		V_{CC} = 2.0 V	13	-	-	19	-	21	-	ns
		V_{CC} = 4.5 V	5	-	-	7	-	7	-	ns
		V_{CC} = 6.0 V	4	-	-	6	-	6	-	ns
		V_{CC} = 3.0 V to 3.6 V	6	-	-	8	-	8	-	ns
		V_{CC} = 4.5 V to 5.5 V	5	-	-	7	-	7	-	ns
t_{su}	set-up time	DS to CP; see Fig. 15								
		V_{CC} = 2.0 V	8	-	-	13	-	14	-	ns
		V_{CC} = 4.5 V	4	-	-	6	-	6	-	ns
		V_{CC} = 6.0 V	4	-	-	6	-	6	-	ns
		V_{CC} = 3.0 V to 3.6 V	6	-	-	9	-	10	-	ns
		V_{CC} = 4.5 V to 5.5 V	4	-	-	6	-	6	-	ns
		$\overline{CE}$ HIGH or LOW to CP; see Fig. 15								
		V_{CC} = 2.0 V	6	-	-	9	-	9	-	ns
		V_{CC} = 4.5 V	4	-	-	5	-	5	-	ns
		V_{CC} = 6.0 V	4	-	-	5	-	5	-	ns
		V_{CC} = 3.0 V to 3.6 V	6	-	-	7	-	7	-	ns
		V_{CC} = 4.5 V to 5.5 V	4	-	-	5	-	5	-	ns
		Dn to $\overline{PL}$; see Fig. 16								
		V_{CC} = 2.0 V	9	-	-	17	-	17	-	ns
		V_{CC} = 4.5 V	4	-	-	6	-	6	-	ns
		V_{CC} = 6.0 V	4	-	-	6	-	6	-	ns
		V_{CC} = 3.0 V to 3.6 V	7	-	-	10	-	10	-	ns
		V_{CC} = 4.5 V to 5.5 V	4	-	-	6	-	6	-	ns
t_h	hold time	DS to CP; see Fig. 15								
		V_{CC} = 2.0 V	0	-	-	0	-	0	-	ns
		V_{CC} = 4.5 V	0	-	-	0	-	0	-	ns
		V_{CC} = 6.0 V	0	-	-	0	-	0	-	ns
		V_{CC} = 3.0 V to 3.6 V	0	-	-	0	-	0	-	ns
		V_{CC} = 4.5 V to 5.5 V	0	-	-	0	-	0	-	ns
		Dn to $\overline{PL}$; see Fig. 16								
		V_{CC} = 2.0 V	5	-	-	6	-	6	-	ns
		V_{CC} = 4.5 V	4	-	-	5	-	5	-	ns
		V_{CC} = 6.0 V	3	-	-	4	-	4	-	ns
		V_{CC} = 3.0 V to 3.6 V	5	-	-	6	-	6	-	ns
		V_{CC} = 4.5 V to 5.5 V	4	-	-	5	-	5	-	ns

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
f_{max}	maximum frequency	CP input; see Fig. 12								
		V_{CC} = 2.0 V	49	-	-	47	-	43	-	MHz
		V_{CC} = 4.5 V	130	-	-	122	-	120	-	MHz
		V_{CC} = 6.0 V	170	-	-	155	-	150	-	MHz
		V_{CC} = 3.0 V to 3.6 V	109	-	-	105	-	96	-	MHz
		V_{CC} = 4.5 V to 5.5 V	130	-	-	122	-	120	-	MHz
C_I	input capacitance		-	1.5	-	-	5	-	5	pF
C_{PD}	power dissipation capacitance	f_i = 1 MHz; C_L = 0 pF; V_I = GND to V_{CC}; V_{CC} = 2 V to 6 V [4][5]	-	20	-	-	-	-	-	pF

[1] Typical values are measured at nominal supply voltage.
[2] t_{pd} is the same as t_{PHL} and t_{PLH}.
[3] t_t is the same as t_{THL} and t_{TLH}.
[4] C_{PD} is used to determine the dynamic power dissipation (P_D in µW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:
f_i = input frequency in MHz;
f_o = output frequency in MHz;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs;
C_L = output load capacitance in pF;
V_{CC} = supply voltage in V.
[5] All 9 inputs switching.

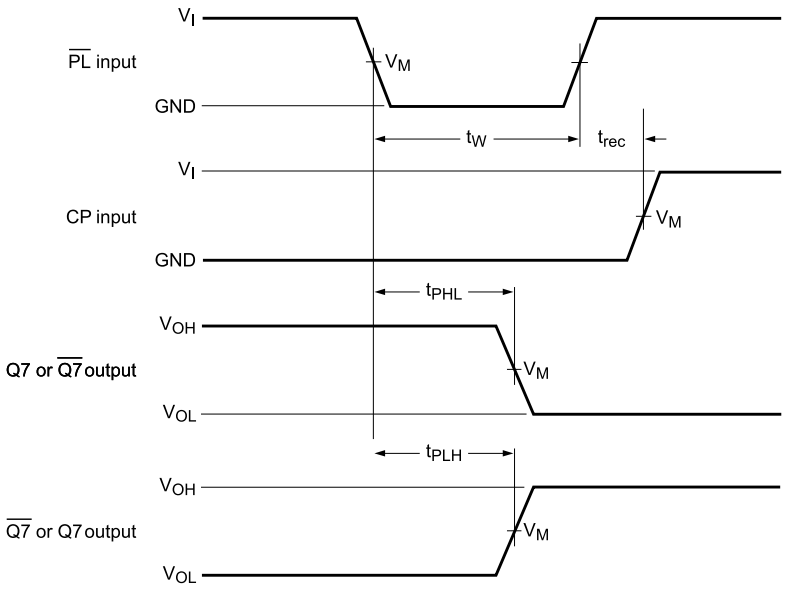
11.1. Waveforms and test circuit



Measurement points are given in Table 8.

V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

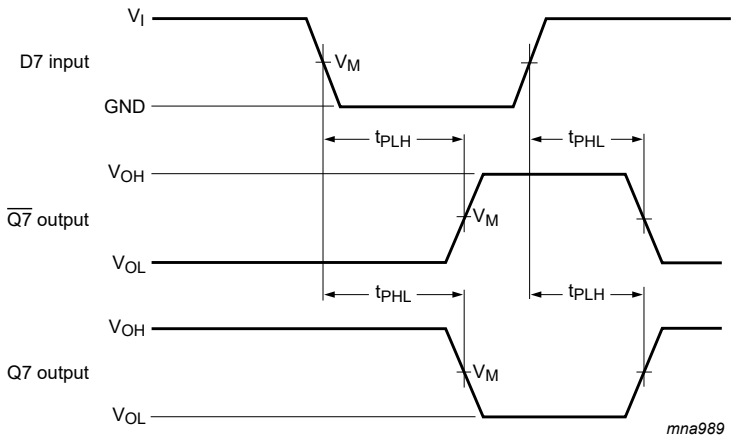
Fig. 12. The clock (CP) to output (Q7 or $\overline{Q7}$) propagation delays, the clock pulse width, the maximum clock frequency and the output transition times



Measurement points are given in Table 8.

V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

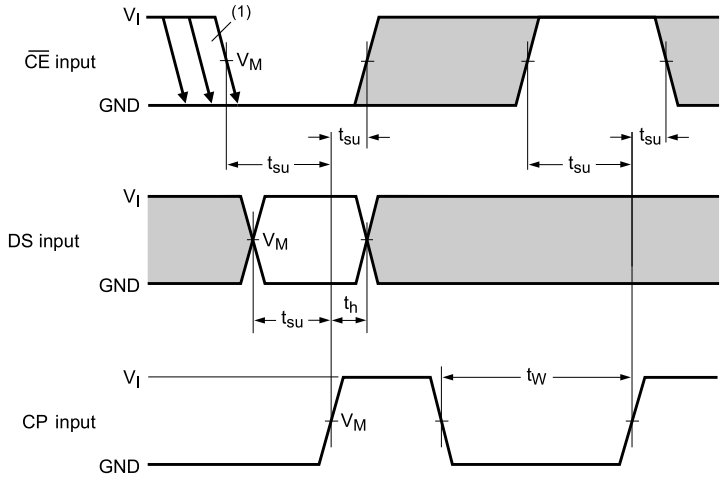
Fig. 13. The parallel load ($\overline{PL}$) pulse width, the parallel load to output (Q7 or $\overline{Q7}$) propagation delays, the parallel load to clock (CP) recovery times



Measurement points are given in Table 8.

V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Fig. 14. The data input (D7) to output (Q7 or $\overline{Q7}$) propagation delays when $\overline{PL}$ is LOW

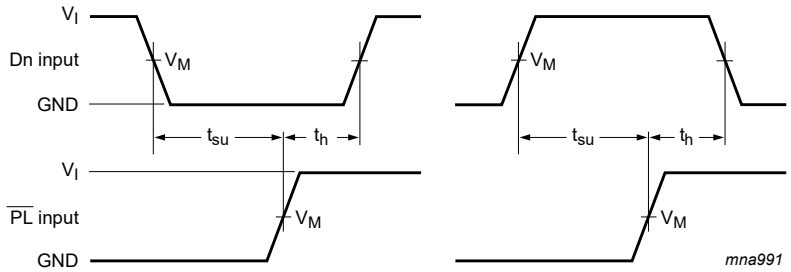


(1) $\overline{CE}$ may change only from HIGH-to-LOW while CP is LOW.

The shaded areas indicate when the input is permitted to change for predictable output performance

Measurement points are given in Table 8.

Fig. 15. The set-up and hold times from the serial data input (DS) to the clock input (CP) and from the clock enable input ($\overline{CE}$) to the clock input (CP)

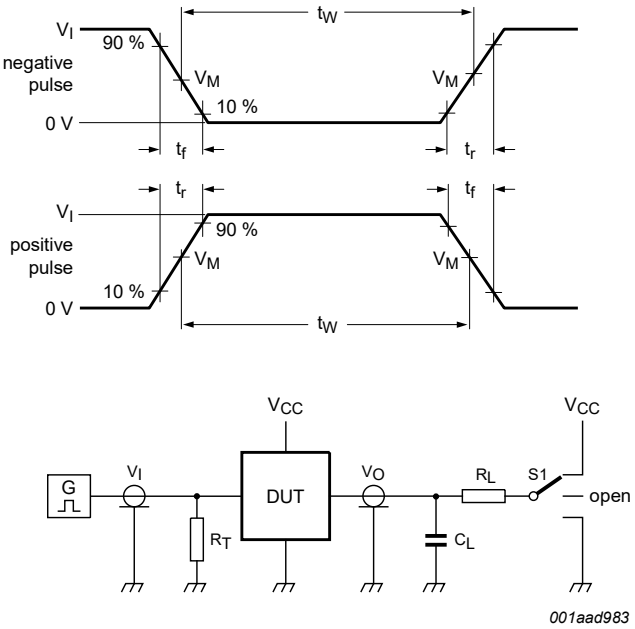


Measurement points are given in Table 8.

Fig. 16. The set-up and hold times from the data inputs (Dn) to the parallel load input ($\overline{PL}$)

Table 8. Measurement points

Input	Output
V_M	V_M
$0.5 \times V_{CC}$	$0.5 \times V_{CC}$



Test data is given in Table 9.

Definitions for test circuit:

R_T = Termination resistance should be equal to output impedance Z_o of the pulse generator;

C_L = Load capacitance including jig and probe capacitance;

R_L = Load resistance;

S1 = Test selection switch

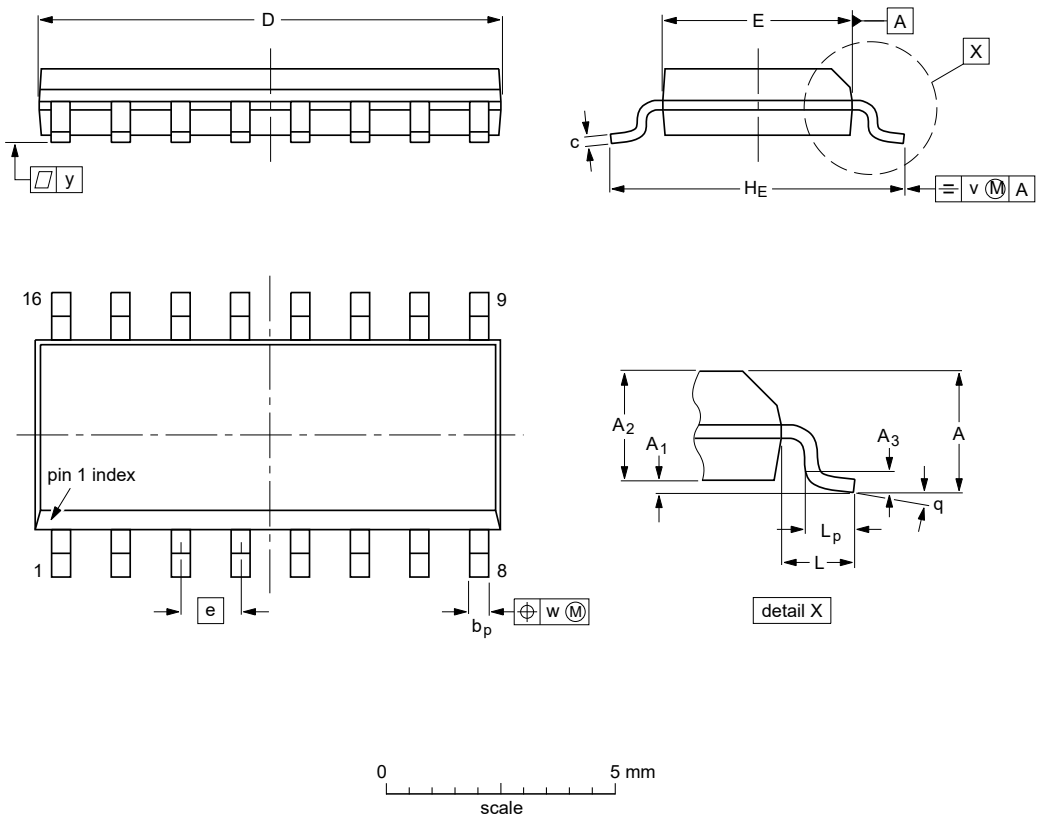
Fig. 17. Test circuit for measuring switching times

Table 9. Test data

Input		Load		S1 position		
V_I	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
V_{CC}	2.5 ns	50 pF	1 kΩ	open	GND	V_{CC}

12. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm **SOT109-1**



Dimensions (inch dimensions are derived from the original mm dimensions)

Unit		A	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	v	w	y	θ
mm	max	1.75	0.25			0.51	0.25	10.0	4.0		6.2		1.27				8°
	nom				0.25					1.27		1.05		0.2	0.25	0.1	
	min		0.10	1.25		0.31	0.10	9.8	3.8		5.8		0.4				0°
inches	max	0.069	0.010			0.020	0.010	0.394	0.16		0.244		0.05				8°
	nom				0.01					0.05		0.041		0.008	0.01	0.004	
	min		0.004	0.049		0.012	0.004	0.386	0.15		0.228		0.016				0°

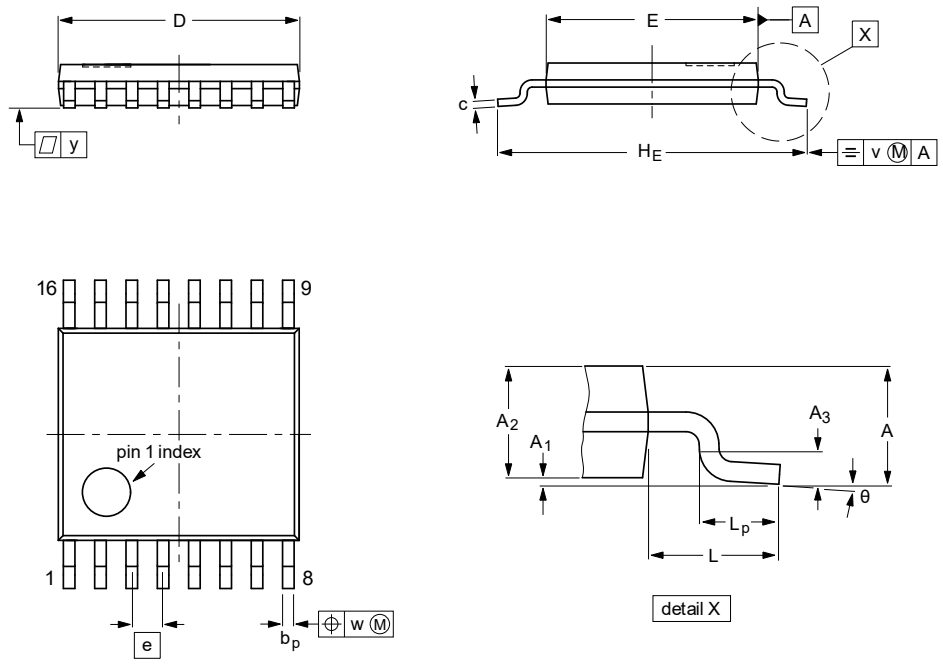
Note
1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

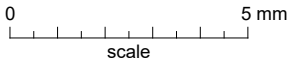
sot109-1_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT109-1		MS-012				~~03-02-19~~ 23-10-27

Fig. 18. Package outline SOT109-1 (SO16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm **SOT403-1**





Dimensions (mm are the original dimensions)

Unit		A	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(2)}$	e	H_E	L	L_p	v	w	y	θ
mm	max	1.20	0.15	1.05		0.30	0.2	5.1	4.5		6.6		0.75				8°
	nom				0.25					0.65		1		0.2	0.1	0.1	
	min		0.05	0.80		0.19	0.09	4.9	4.3		6.2		0.45				0°

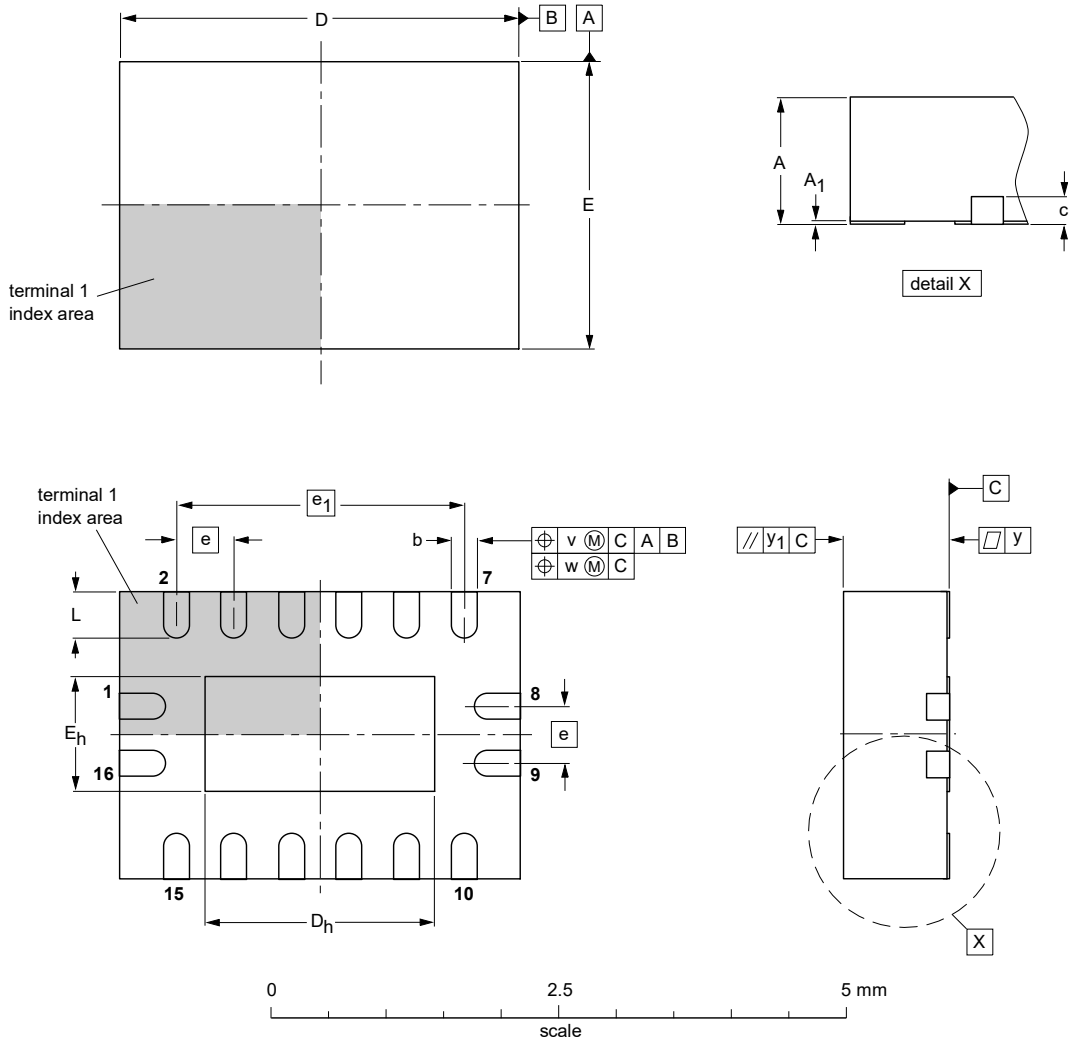
Note
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

sot403-1_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT403-1		MO-153				~~03-02-18~~ 23-10-27

Fig. 19. Package outline SOT403-1 (TSSOP16)

DHVQFN16: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 16 terminals; body 2.5 x 3.5 x 0.85 mm **SOT763-1**



DIMENSIONS (mm are the original dimensions)

UNIT	$A^{(1)}$ max.	A_1	b	c	$D^{(1)}$	D_h	$E^{(1)}$	E_h	e	e_1	L	v	w	y	y_1
mm	1	0.05 0.00	0.30 0.18	0.2	3.6 3.4	2.15 1.85	2.6 2.4	1.15 0.85	0.5	2.5	0.5 0.3	0.1	0.05	0.05	0.1

Note

1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT763-1	- - -	MO-241	- - -			~~02-10-17~~ 03-01-27

Fig. 20. Package outline SOT763-1 (DHVQFN16)

13. Abbreviations

Table 10. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HCS165 v.1	20250527	Product data sheet	-	-

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HCS165_Q100 v.1	20250527	Product data sheet	-	-

15. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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